Claims

1   1. A method of generating an ultrawideband radio frequency pulse, comprising:

2   generating a carrier signal having a selected frequency;

3   shaping the carrier signal with a window function to produce an

4   ultrawideband pulse.

1   2. The method of claim 1, wherein the window function comprises a sinusoidal

2   function.

1   3. The method of claim 2, wherein the window function comprises one of a

2   Hamming window, a Hanning window, and a Blackman window.

1   4. The method of claim 1, further comprising gating the shaped carrier to produce

2   the ultrawideband pulse.

1   5. The method of claim 1, wherein the method is performed via a mixer and a

2   CMOS radio frequency switch.

1   6. An ultrawideband radio frequency signal generator, comprising:

2   a first signal generator operable to generate a sinusoidal window function;

3   a second signal generator operable to generate a carrier signal; and

4   a mixer operable to produce an ultrawideband radio frequency product signal

5   as a product of the sinusoidal window function and the carrier signal.

1   7. The ultrawideband radio frequency signal generator of claim 6, further

2   comprising an RF switch operable to gate the ultrawideband radio frequency output

3   signal.

1   8. The ultrawideband radio frequency signal generator of claim 7, wherein the RF

2   switch comprises a P-FET, a first N-FET and a second N-FET;

3   the source of the P-FET coupled to the first voltage source, the gate of the P-

4   FET coupled to the input voltage level, and the drain of the P-FET coupled to the

5   drain of the first N-FET and the gate of the second N-FET;

6   the gate of the first N-FET coupled to receive the control signal, and the

7   source of the first N-FET coupled to the drain of the second N-FET;

8   the source of the second N-FET coupled to the voltage reference.

1   9. The ultrawideband radio frequency signal generator of claim 6, wherein the

2   mixer comprises a single-balanced mixer.

1   10. The ultrawideband radio frequency signal generator of claim 6, wherein the

2   mixer comprises a double-balanced mixer.

1   11. The ultrawideband radio frequency signal generator of claim 6, wherein the

2   mixer comprises a cascade of two or more fixed transconductance amplifiers.

1   12. An ultrawideband radio frequency data communications device, comprising:

2   a first signal generator operable to generate a sinusoidal window function;

3   a second signal generator operable to generate a carrier signal; and

4   a mixer operable to produce an ultrawideband radio frequency product signal

5   as a product of the sinusoidal window function and the carrier signal.

1   13. The ultrawideband radio frequency data communications device of claim 12,

2   further comprising an RF switch operable to gate the ultrawideband radio frequency

3   output signal.

1 14. The ultrawideband radio frequency data communications device of claim 13,
2 wherein the RF switch comprises a plurality of CMOS transistors.

1 15. The ultrawideband radio frequency data communications device of claim 12,
2 wherein the mixer comprises a single-balanced mixer.

1 16. The ultrawideband radio frequency data communications device of claim 12,
2 wherein the mixer comprises a double-balanced mixer.

1 17. The ultrawideband radio frequency data communications device of claim 12,
2 wherein the mixer comprises a cascade of two or more fixed transconductance
3 amplifiers.

1 18. A method of generating an ultrawideband radio frequency signal, comprising:
2   generating a sinusoidal carrier signal having a selected frequency;
3   generating a sinusoidal window shaping signal having a frequency lower
4 than that of the carrier signal;
5   mixing the carrier signal and window shaping signal to obtain a product
6 signal; and
7   gating the product signal to form an ultrawideband signal such that the
8 window shaping signal component of the product forms a sinusoidal window pulse
9 function.

1 19. The method of claim 18, wherein the sinusoidal window pulse function
2 comprises one of a Hamming window, a Hanning window, and a Blackman
3 window.

1 20. The method of claim 18, wherein the gating is performed via a CMOS radio
2 frequency switch.

1 21. An ultrawideband radio frequency signal generator, comprising:

2   a first signal generator operable to generate a sinusoidal window function;

3   a second signal generator operable to generate a carrier signal; and

4   a mixer operable to produce an ultrawideband radio frequency product signal

5 as a product of the sinusoidal window function and the carrier signal; and

6   an RF switch operable to gate the ultrawideband radio frequency product

7 signal, wherein the RF switch comprises at least three coupled CMOS transistors.

1 22. The ultrawideband radio frequency signal generator of claim 21, wherein the at

2 least three coupled CMOS transistor are coupled to a first voltage source, a voltage

3 reference of a different voltage than the first voltage source, an input voltage level, a

4 control signal, and an output conductor.

1 23. The ultrawideband radio frequency signal generator of claim 22, comprising a

2 P-FET, a first N-FET and a second N-FET;

3   the source of the P-FET coupled to the first voltage source, the gate of the P-

4 FET coupled to the input voltage level, and the drain of the P-FET coupled to the

5 drain of the first N-FET and the gate of the second N-FET;

6   the gate of the first N-FET coupled to receive the control signal, and the

7 source of the first N-FET coupled to the drain of the second N-FET;

8   the source of the second N-FET coupled to the voltage reference.

1 24. The ultrawideband radio frequency signal generator of claim 22, wherein the

2 voltage reference comprises a ground voltage level.

1 25. An ultrawideband radio frequency data communications system, comprising:

2   a first signal generator operable to generate a sinusoidal window function;

3   a second signal generator operable to generate a carrier signal;

4   a mixer operable to produce an ultrawideband radio frequency product signal

5   as a product of the sinusoidal window function and the carrier signal;

6   a modulator that is coupled to receive a data signal from a data signal source,

7   the modulator further coupled to modulate the ultrawideband radio frequency

8   product with the data signal; and

9   an antenna coupled to receive the ultrawideband radio frequency product

10   signal and further operable to transmit the ultrawideband radio frequency product

11   signal.

1   26. The ultrawideband radio frequency data communications system of claim 25,

2   wherein the modulator is coupled to the carrier signal produced by the second signal

3   generator, thereby operable to modulate the ultrawideband radio frequency product

4   with the data signal by modulating the carrier signal.

1   27. The ultrawideband radio frequency data communications system of claim 25,

2   wherein the modulator is coupled to the ultrawideband radio frequency product

3   signal output from the mixer, thereby operable to modulate the ultrawideband radio

4   frequency product signal with the data signal.

1   28. The ultrawideband radio frequency data communications system of claim 25,

2   further comprising an RF switch coupled between the mixer and the antenna,

3   thereby operable to gate the ultrawideband radio frequency product signal with the

4   data signal.

1   29. The ultrawideband radio frequency data communications system of claim 28,

2   wherein the mixer is coupled to the RF switch, thereby operable to modulate the

3   ultrawideband radio frequency product signal with the data signal.